

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of claims:

Claims 1-89. (Cancelled)

90. (New) A method of generating a frozen viable cartilage, comprising:

(a) providing a receptacle containing a viable cartilage in a cryopreservation solution at a temperature above a freezing temperature of the cryopreservation solution;

(b) cooling the viable cartilage in the cryopreservation solution to a temperature below the freezing temperature of the cryopreservation solution at a cooling rate of 0.01°C/min to 3°C/min, thereby generating a frozen viable cartilage in the receptacle; and

(c) transferring the receptacle to storage at a temperature equal to or below -130°C,

wherein upon thawing the thawed viable cartilage comprises more than 50% viable chondrocytes.

91. (New) The method of claim 90, wherein cooling comprises moving the receptacle along one or more consecutive temperature gradients ranging from a temperature above the freezing temperature to a temperature below the freezing temperature.

92. The method of claim 90, wherein cooling comprises controlled initiation of seeding of freezing.

93. The method of claim 90, wherein the viable cartilage comprises osteochondral tissue.

94. The method of claim 91, wherein movement along the at least one temperature gradient is at a velocity between 0.002 mm/sec and 5 mm/sec and at a cooling rate of between 0.1°C/mm to 50°C/mm.

95. The method of claim 91, wherein at least one of the one or more consecutive temperature gradients is between 0.1°C/mm to 50°C/mm.

96. Frozen viable cartilage produced by the method of claim 91.

97. A method for thawing a frozen viable cartilage that was frozen in a cryopreservation-solution, the method comprising:

(a) providing a receptacle containing the frozen viable cartilage at an initial temperature below the glass transition temperature of the cryopreservation-solution;

(b) warming the receptacle containing the frozen viable cartilage and the cryopreservation solution from the initial temperature to an intermediate temperature being at least about the glass transition temperature or above the glass transition temperature of the

cryopreservation solution but no more than the transition temperature of the cryopreservation solution wherein recrystallization would begin to occur at any point in the cartilage; and

(c) warming the frozen viable cartilage and the cryopreservation solution from the intermediate temperature to a temperature that is at least substantially equal to the melting temperature of the cryopreservation solution, the warming being at a rate sufficiently high to minimize recrystallization; thereby obtaining thawed viable cartilage,

wherein upon thawing the thawed viable cartilage comprises more than 50% viable chondrocytes.

98. The method of claim 97, wherein warming is at a rate sufficiently slow to minimize fracture of the frozen viable cartilage.

99. The method of claim 97, wherein warming is at a rate of between 0.1°C/min and 200°C/min.

100. The method of claim 99, wherein warming is at a rate of 90°C/min.

101. The method of claim 97, wherein warming is at a rate of between 50°C/min and 1000°C/min.

102. The method of claim 101, wherein warming is at a rate of 200°C/min.

103. The method of claim 97, wherein the intermediate temperature is less than -10°C, or -20 to -80°C, or -40 to -80°C, or -50 to -70°C.

104. The method of claim 97, wherein warming comprises:

- (i) removing the frozen viable cartilage from the receptacle; and
- (ii) contacting the frozen viable cartilage with an environment having the temperature that is at least substantially equal to the melting temperature of the cryopreservation solution, the temperature being 0°C or more.

105. The method of claim 104, wherein the temperature of the environment is at least 22°C, at least 37°C, at least 50°C, or at least 70°C.

106. The method of claim 104, wherein the frozen viable cartilage is connected to a pulling member and removing comprises pulling the pulling member.

107. Thawed viable cartilage produced by the method of claim 97.

108. A method of providing a patient having impaired cartilage in an organ at a target site, with a thawed viable cartilage, the method comprising:

- (a) providing the thawed viable cartilage of claim 107 having a shape and size compatible with the target site in the organ; and
- (b) grafting the thawed viable cartilage in the target site,

wherein the grafted cartilage is viable.

109. The method of claim 108, wherein the organ is a joint.

110. The method of claim 108, wherein the thawed viable cartilage comprises osteochondral tissue.

111. The method of claim 90, wherein said storage is at a temperature between -130°C and -196°C.